Operating Manual

Sensors

www.levelprosales.com

1. General information

1.1 Information on the operating manual

This operating manual contains important information on proper usage of the device. Read this operating manual carefully before installing and starting up the pressure measuring device.

Adhere to the safety notes and operating instructions which are given in the operating manual. Additionally applicable regulations regarding occupational safety, accident prevention as well as national installation standards and engineering rules must be compiled with.

This operating manual is copyrighted. The contents of this operating manual reflect the version available at the time of printing. It has been issued to our best knowledge. However, errors may have occurred. **Levelpro** is not liable for any incorrect statements and their effects.

-Technical modifications reserved-

1.2 Symbols used

⚠ DANGER! – dangerous situation, which may result in death or serious injuries

⚠ WARNING! – potentially dangerous situation, which may result in death or serious injuries

⚠ CAUTION! – potentially dangerous situation, which may result in minor injuries

! CAUTION! – potentially dangerous situation, which may result in physical damage

☞ NOTE – tips and information to ensure a failure-free operation

1.3 Target group

⚠ WARNING! To avoid operator hazards and damages of the device, the following instructions have to be worked out by qualified technical personnel.

1.4 Limitation of liability

By non-observance of the operating manual, inappropriate use, modification or damage, no liability is assumed and warranty claims will be excluded.

1.5 Intended use

- The probes have been developed for continuous level measurement. It is the operator's responsibility to check and verify the suitability of the device for the intended application. If any doubts remain, please contact our sales department in order to ensure proper usage. **Levelpro** is not liable for any incorrect selections and their effects!
- Permissible media are gases or liquids (no solids and frozen media), specified in the data sheet. In addition it has to be ensure, that this medium is compatible with the media wetted parts.
- The technical data listed in the current data sheet are engaging and must be complied with.
- If the data sheet is not available, please order or download it from our homepage. (www.levelprosales.com)

⚠ WARNING! – Danger through improper usage!

1.6 Package contents

Please verify that all listed parts are undamaged included in the delivery and check for consistency specified in your order:

- probe
- mounting instructions
- with option SIL2 version:
  Functional Safety Manual, Functional Safety Data Sheet, SIL Declaration of Conformity

2. Product Identification

The device can be identified by its manufacturing label. It provides the most important data. By the ordering code the product can be clearly identified.

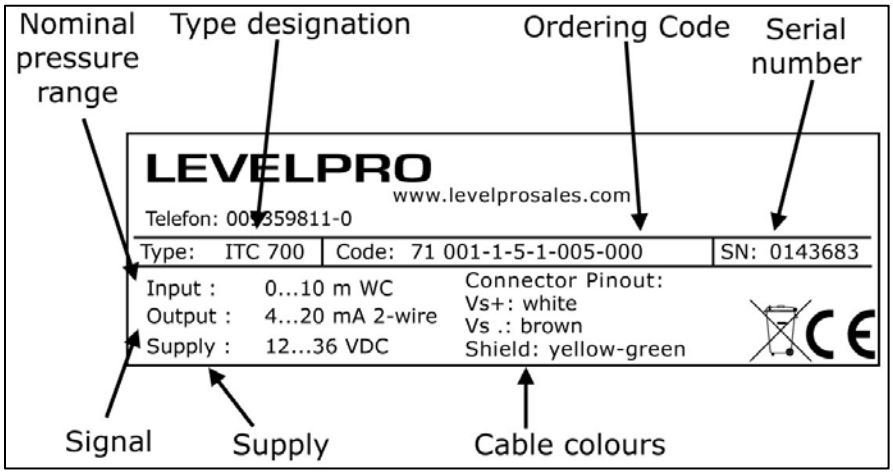


Fig. 1 manufacturing label

! The manufacturing label must not be removed from the device!

3. Mechanical Installation

3.1 Mounting and safety instructions

⚠ WARNING! Install the device only when depressurized and currentless!

⚠ WARNING! This device may only be installed by qualified technical personnel who has read and understood the operating manual!

! Handle this high-sensitive electronic precision measuring device with care, both in packed and unpacked condition!

- ! There are no modifications/changes to be made on the device.
- ! Do not throw the package/device!
- ! To avoid damaging the diaphragm, remove packaging and protective cap directly before starting assembly. The delivered protective cap has to be stored
- ! Place the protective cap on the pressure port again immediately after disassembling.
- ! Handle the unprotected diaphragm very carefully – it is very sensitive and may be easily damaged.
- ! Do not use any force when installing the device to prevent damage of the device and the plant!
- ! When placing the device into operation or after maintenance work, the probe has to be submerged slowly into the medium! A rough immersion into the medium can damage or destroy the diaphragm.
- ! If there is any danger of damage by lightning or overpressure when the device is installed outdoor, we suggest putting a sufficiently dimensioned overpressure protection between the supply or switch cabinet and the device.

3.2 Installation steps for probe

- Carefully remove the pressure measuring device from the package and dispose of the package properly.
- Mount the device according to your demands.

☞ Usually, the probe has been delivered without mounting accessories. For different mounting demands, **Levelpro** offers as accessories mounting clamps, terminal clamps and mounting flanges.

3.3 Installation steps for flange version (LMK 382 / LMK 382 H)

- Carefully remove the pressure measuring device from the package and dispose of the package properly.
- Please ensure that the mounting thread is clean and free of damage.
- Check to ensure that the O-ring fits properly in the groove.
- Screw in the mounting thread of the transmitter in the transmitter flange.
- Next, tighten it by an open-end wrench, (approx… 25 Nm)
- Install the flange according to your demands.

☞ If a new transmitter flange is needed, it can be ordered from **Levelpro.**

3.4 Removing the protecting cap (if existing)

For the protection of the diaphragm, some of the probes have a plugged-on protection cap. If the device shall be used in high-viscosity media such as sludge, a removal of the cap before start-up is necessary. Thus, the sensor becomes flush and the medium will attain quickly to the diaphragm.

☞ If it is necessary for your application to remove the protection cap, this has to be done with utmost care. To prevent a damage of the diaphragm, please follow these instructions.

Removal by hand

- Hold the probe in a way that the protection cap points upwards.
- Hold the probe with one hand on the sensor section (1).
- Remove the protection cap (2) with the other hand.

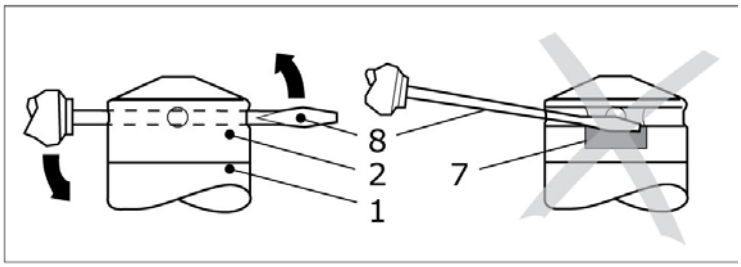


Fig. 2 removal of protection cap

- Hold the probe in a way that the protection cap points upwards.
- Slide a small tool such as a screwdriver (8) straight through two opposite drill holes in the protective cap (2)
- Lever it off by moving up the handle of the screwdriver.

☞ Make sure that the sensor (7) under the protection cap will not be damaged!

3.5 Cable protection (optional)

On order, the probe has been delivered with cable protection; if the device has optionally been prepared for mounting with stainless steel or PVC pipe, a suitable cable protection has to be mounted by the customer.

☞ The probe must be installed in such a way that rubbing or impact of the device, e.g. against a tank wall, is prevented, it is also important to consider the operating conditions such as flow conditions.

4. Electrical Installation

⚠ WARNING! Install the device only when currentless!

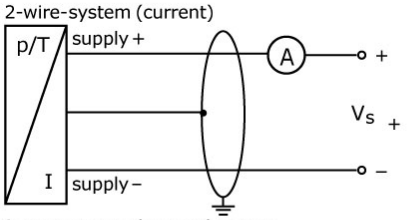
Establish the electrical connection of the device according to the technical data shown on the manufacturing label, the following table and the wiring diagram.

Pin configuration:

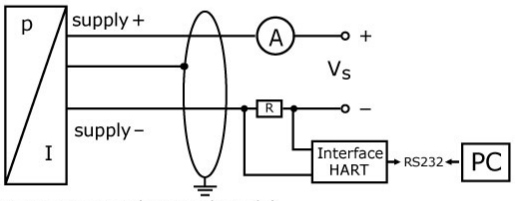
Electrical connections	Cable colours
Suppy + Supply – Signal + (only 3-wire)	wh (white) bn (brown) gn (green)
Shield	gn/ye (green / yellow)
LMK 307T and LMP 037T	cable colours
Supply P+ Suppy P- Supply T+ Supply T-	wh (white) bn (brown) gr (gray) pn (pink)
Shield	gn/ye (yellow / green)

Wiring diagrams:

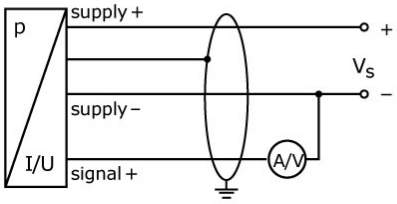
2-wire-system (current)



2-wire-system (current) HART



3-wire-system (current/supply)



! A minimum static bending radius has to be complied with. For static installation use the 10-fold cable diameter, for dynamic applications use the 20-fold diameter.

! Prevent the damage or removal of the PTFE filter which is fixed over the end of the air tube on devices with cable outlet and integrated air tube.

☞ For the electrical connection a shielded and twisted multicore cable is recommended.

☞ If a transition is desired from a probe cable with gauge tube to a cable without gauge tube, we recommend our terminal box KL 1 or KL 2.

☞ Usually, the required cable is included in the scope of delivery. If it is although necessary to connect an existing or special cable, the total resistance will increase. For application, where this additional resistance of the connecting cable could cause problems, this cable has to be checked with the following calculation.

$$R_L = \frac{\rho \cdot 2 \cdot l}{A}$$

with R_L: resistance of connecting cable in Ω
ρ: specific resistant in Ω mm²/m
l: cable length in m
A: cross section of conductor in mm²

$$V_{tot} = (R_{L1} + R_{L2} + \ldots + R_{load}) \cdot 0.02\ A$$

with V_{tot}: total voltage drop
R_{load}: load resistance (to be taken out of the current data sheet)
the following condition has to be fulfilled:

$$V_s > V_{tot} + V_{s\ min}$$

with V_s: planned supply voltage
$V_{s\ min}$: minimal supply voltage (to be taken out of the current data sheet)

5. Characteristic

5.1 HART communication (in H-devices)

The analogue output signal is overridden by an additional signal according to the HART – specification. The device can be configured via a HART – communication device. Therefore we suggest our programming kit CIS 155 (available as accessory). It consists of HART –modem, connecting cables as well as configuration of all parameters. (The software is compatible will all Windows – systems from Windows 98 and higher.)

To ensure a trouble-free operating the following requirements should be fulfilled:

Maximal cable length between device and power supply:

$$L_{max} = \frac{65 \cdot 10^6}{R_V \cdot C_V} - \frac{40 \cdot 10^3}{C_V}$$

whereas L_{max}: maximum length of cable in [m]
R_v: resistance of the cable together with the load resistance in [Ω]
C_v: capacity of the cable in [pF/m]

resistance R:

$$R = \frac{U - 12}{0.024} \Omega$$

whereas U: power supply in [V_{DC}]
The resistance must be at least 240 Ω.

5.2 Separable probes

In order to facilitate stock keeping and maintenance, the probe head is plugged to the cable assembly with a connector and can be easily changed.

Disassembly

- Hold the probe on the sensor section (2) with one hand and turn the nut (4) carefully to the left with the other hand. Prevent torsion of the cable section (3) against the housing!
- While screwing and pulling of the sensor section (2) from the cable section (3), hold it straight to prevent damages on the plugs.

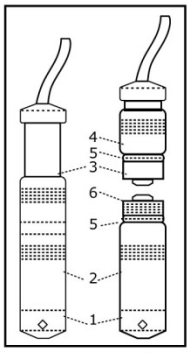


Fig. 3 separability

Assembly

- Check the o-rings (5,6) and exchange damaged o-rings if necessary.
- Lubricate the radial o-rings (5) with Vaseline or o-ring grease.
- Remove any grease residue from the axial o-ring (6).
- Plug the cable section (3) straight into the plug of the sensor section (2)
- Hold the probe onto the sensor section (2) with one hand. Screw on and tighten the nut (4) carefully with the other hand. Prevent torsion of the cable section (3) against the housing!

Pin configuration

Electrical connections	Binder series 723 (5-pin)	Binder series 723 (7-pin)
2-wire system		
Supply + Supply -	3 1	3 1
Shield	5	2
3-wire system		
Supply + Supply – Signal +	3 4 1	3 1 6
Shield	5	2
Communication interface		
RxD TxD GND	- - -	4 5 7

5.3 Accuracy 0.1 % FSO

Devices with an accuracy of 0.1 % FSO have micro-controlled electronics for processing and improving the signal. As a matter of principle, the processing takes more time than for analogue sensors, which have only an amplifier. Due to this longer response time, the output signal follows the measured value discontinuously. For relatively stable measuring values, this characteristic is secondary. Please compare the specification for the response time in the data sheet.

5.4 Communication interface (i-devices)

Intelligent devices with an optional communication interface can also be configured with these electronics. Offset, span and damping are programmable within the limits given in the data sheet. For configuration, the programming kit CIS 155 consisting of Adapt 1, power supply and Windows compatible programming software is necessary. This can be ordered as accessory from **Levelpro**.

6. Initial start-up

⚠ WARNING! Before start-up, the user has to check for proper installation and for any visible defects.

⚠ WARNING! The device can be started and operated by authorized personnel only, who have read and understood the operating manual!

⚠ WARNING! The device has to be used within the technical specifications, only (compare the data in the data sheet)!

7. Placing out of service

⚠ WARNING! When dismantling the device, it must always be done in the depressurized and currentless condition! Check also if the medium has to be drained off before dismantling!

⚠ WARNING! Depending on the medium, it may cause danger for the user. Comply therefore with adequate precautions for purification.

8. Maintenance

In principle, this device is maintenance-free. If desired, the housing of the device can be cleaned when switched off using a damp cloth and non-aggressive cleaning solutions.

Depending on the measuring medium, however, the diaphragm may be polluted or coated with deposit. If the medium is known for such tendencies, the user has to set appropriate cleaning intervals. After placing the device out of service correctly, the diaphragm can usually be cleaned carefully with a non-aggressive cleaning solution and a soft brush or sponge. If the diaphragm is calcified, it is recommended to send the device to **Levelpro** for decalcification. Please read therefore chapter “Service / Repair” below.

! An incorrect cleaning can cause irreparable damages on the diaphragm. Never use spiky objects or pressured air for cleaning the diaphragm.

9. Service / Repair

9.1 Recalibration

During the life-time of a probe, the value of offset and span may shift. As a consequence, a deviating signal value in reference to the nominal pressure range starting point or end point may be transmitted. If one of these two phenomena occurs after prolonged use, a recalibration is recommended to ensure furthermore high accuracy.

9.2 Return

Before every return of your device, whether for recalibration, decalcification, modifications or repair, it is necessary to contact us to ensure a fast handling of your request. It is necessary to contact us to ensure a fast handling of your request. Please inform us by calling us at: **1-855-879-4266** include the number of devices sent and request a RMA. Then clean the device and pack it shatterproof before send it to **Levelpro** indicating the RMA.

10. Disposal

The device must be disposed according to the European Directives 2002/96/EG and 2003/108/EG (on waste electrical and electronic equipment) Waste of electrical and electronic equipment may not be disposed by domestic refuse!

⚠ WARNING! Depending on the measuring medium, deposit on the device may cause danger for the user and the environment. Comply with adequate precautions for purification and dispose of it properly.

11. Warranty conditions

The warranty conditions are subject to the legal warranty period of 24 months from the date of delivery. In case of improper use, modifications of or damages to the device, we do not accept warranty claims. Damaged diaphragms will also not be accepted. Furthermore, defects due to normal wear are not subject to warranty services.